SEQUENCE LISTING

<110> University of Florida Research Foundation, Inc. Hannah, L. Curtis Lyerly Linebarger, Carla R. <120> Heat Stable Variants of Adenosine Diphosphate Glucose Pyrophosphorylase <130> UF.371XC1 <140> 10/569.000 <141> 2006-10-10 <150> PCT/US2004/026965 <151> 2004-08-18 <150> 60/496,188 <151> 2003-08-18 <160> 44 <170> PatentIn version 3.5 <210> 1 <211> 1425 <212> DNA <213> zea mays <400> 1 atggacatgg ctttggcgtc taaagcctcc cctccgccat ggaatgccac cgccgccgag 60 cagccaattc caaagcgtga caaagccgct gcaaatgatt caacatacct caatcctcaa 120 qctcatqata qtqttcttqq aatcattctq qgaggtqgtq ctgggactag attgtacccc 180 ttqacaaaqa agcqtqccaa qcctqcagtq ccattqqqtq ccaactatag actqattqat 240 300 attoctqtca qcaattqtct caacaqcaac atatccaaga tctatgtgct aacgcaattt 360 aactotgott cootcaaccg toacctotca agagootacg ggagcaacat tggagggtac aagaatgaag ggtttgttga agtcttagct gcacagcaga gcccagataa tccaaactgg 420 tttcagggta ctgcagatgc tgtaaggcag tacttgtggt tgtttgagga gcataatgtg 480 atggaatttc taattettge tggegateac etgtacegga tggaetatga aaagtteatt 540 caggeacaca gagaaacaaa tgctgatatt accgttgctg ccctaccgat ggatgagaaa 600 660 cgtgcaactg catttggcct catgaaaatt gatgaagaag ggaggatcat tgagtttgct 720 gagaaaccga aaggagagca gttgaaagca atgatggttg acaccaccat acttggcctt gatgacgtga gggcaaagga aatgccttat attgctagca tgggtatcta tgttttcagc 780

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Tyr Gly Ser Asn Ile Gly Gly Tyr Lys Asn Glu Gly Phe Val Glu Val 115 120 125

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Ala Ala	Leu Pr 195	Met A	sp Glu	Lys 200	Arg	Ala	Thr	Ala	Phe 205	Gly	Leu	Met
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Asp Ser Thr Cys Leu Asn Pro Gln Ala His Asp Ser Val Leu Gly Ile 35 $$40\$

Ile Leu Gly Gly Gly Ala Gly Thr Arg Leu Tyr Pro Leu Thr Lys Lys 50 55 60

Arg Ala Lys Pro Ala Val Pro Leu Gly Ala Asn Tyr Arg Leu Ile Asp 65 70 75 80

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Ala Asp Ala Val Arg Gln Tyr Leu Trp Leu Phe Glu Glu His Asn Val 145 150 155 160

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- Lys Arg Ala Lys Pro Ala Val Pro Leu Gly Ala Asn Tyr Arg Leu Ile 65 70 75 80
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- Phe Pro Glu Ala Asn Asp Phe Gly Ser Glu Val Ile Pro Gly Ala Thr $275 \hspace{1cm} 285 \hspace{1cm}$
- Ser Ile Gly Lys Arg Val Gln Ala Tyr Leu Tyr Asp Gly Tyr Trp Glu 290 295 300

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Lys	Lys	Pro	Ile	Pro 325	Asp	Phe	Ser	Phe	Tyr 330	Asp	Arg	Phe	Ala	Pro 335	Ile		
Tyr	Thr	Gln	Pro 340	Arg	His	Leu	Pro	Pro 345	Ser	Lys	Val	Leu	Asp 350	Ala	Asp		
Val	Thr	Asp 355	Ser	Val	Ile	Gly	Glu 360	Gly	Сув	Val	Ile	Lys 365	Asn	Cys	Lys		
Ile	Asn 370	His	Ser	Val	Val	Gly 375	Leu	Arg	Ser	Cys	Ile 380	Ser	Glu	Gly	Ala		
Ile 385	Ile	Glu	Asp	Ser	Leu 390	Leu	Met	Gly	Ala	Asp 395	Tyr	Tyr	Glu	Thr	Glu 400		
Ala	Asp	Lys	Lys	Leu 405	Leu	Ala	Glu	Lys	Gly 410	Gly	Ile	Pro	Ile	Gly 415	Ile		
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tqq	tttc	agg	gtac	tgca	ga t	gctg	taag	g ca	gtac	ttgt	ggt	tgtt	tga	ggag	cataat	48	0

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Ile Ile Leu Gly Gly Gly Ala Gly Thr Arg Leu Tyr Pro Leu Thr Lys 50 55 60

Lys Arg Ala Lys Pro Ala Val Pro Leu Gly Ala Asn Tyr Arg Leu Ile 65 70 75 80

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330

Tyr Thr Gln Pro Arg His Leu Pro Pro Ser Lys Val Leu Asp Ala Asp 340 345 350

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	aac Asn 145							483
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	gta Val							627
	ttg Leu							675
	aaa Lys 225							723
	gat As p							771

	240					245					250					
	act Thr															819
	aat Asn															867
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	gac Asp 320															1011
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agg	aac	tgt	atc	att	gac	atg	aat	gct	agg	att	ggg	aag	aac	gtg	gtg	1443

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tac tcg tac tac ata agg tct gga atc gtg gtg atc ctg aag aat gca Tyr Ser Tyr Tyr Ile Arg Ser Gly Ile Val Val Ile Leu Lys Asn Ala 495 500 505 510	1539
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Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe Gly Gly 35 $$40$$	
Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala Cys Pro 50 60	
Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr Ala Asp $_{\rm 65}$ $$ 70 $$ 75 $$ 80	
Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly Ser Gln $$90$$	
Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro Val Gly 100 $$105\ \ 100$	
Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe Asn Ser 115 120 125	
Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr Ser Leu 130 $$140$	
Asn Arg His Ile His Arg Thr Tyr Leu Glu Gly Gly Ile Asn Phe Ala 145 $$150$$	
Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu Glu Pro 165 170 175	

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Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
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									atg Met							435
									tac Tyr							483
									gcg Ala							531
									gca Ala							579
									cac His 200							627
									cgg Arg							675
									gat Asp							723
									aat Asn			Val				771
cat	act	gga	cgt	gta	ctt	caa	ttc	ttt	gaa	aaa	cca	aag	ggt	gct	gat	819

His 255	Thr	Gly	Arg	Val	Leu 260	Gln	Phe	Phe	Glu	Lys 265	Pro	Lys	Gly	Ala	Asp 270	
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Asp	Glu	Ser	Arg	Ala 245	Ser	Lys	Asn	Gly	Leu 250	Val	Lys	Ile	Asp	His 255	Thr
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Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe
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					gag Glu											723
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		tta Leu						963
		gaa Glu						1011
		ttt Phe 340						1059
		gca Ala						1107
		cca Pro						1155
		ttg Leu						1203
		ctg Leu						1251
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1576

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200

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Asn Arg His Ile His Arg Thr Tyr Leu Glu Gly Gly Ile Asn Phe Ala 145 150

Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu Glu Pro

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Asn Arg His Ile His Arg Thr Tyr Leu Glu Gly Gly Ile Asn Phe Ala 145 Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu Glu Pro 165 170 Ala Gly Trp Phe Gln Gly Thr Ala Asp Ser Ile Arg Lys Phe Ile Trp 185 Val Leu Glu Asp Tyr Tyr Ser His Lys Ser Ile Asp Asn Ile Val Ile 200 Leu Ser Gly Asp Gln Leu Tyr Arg Met Asn Tyr Met Glu Leu Val Gln Lys His Val Glu Asp Asp Ala Asp Ile Thr Ile Ser Cys Ala Pro Val 235 Asp Glu Ser Arq Ala Ser Lys Asn Gly Leu Val Lys Ile Asp His Thr 245 250 255 Gly Arg Val Leu Gln Phe Phe Glu Lys Pro Lys Gly Ala Asp Leu Asn 265 Ser Met Arq Val Glu Thr Asn Phe Leu Ser Tyr Ala Ile Asp Asp Ala 280 Gln Lys Tyr Pro Tyr Leu Ala Ser Met Gly Ile Tyr Val Phe Lys Lys 290 295 Asp Ala Leu Leu Asp Leu Leu Lys Ser Lys Tyr Thr Gln Leu His Asp 315 Phe Glv Ser Glu Ile Leu Pro Arq Ala Val Leu Asp Tyr Ser Val Gln 325 335 Ala Cys Ile Phe Thr Gly Tyr Trp Glu Asp Val Gly Thr Ile Lys Ser Phe Phe Asp Ala Asn Leu Ala Leu Thr Glu Gln Pro Ser Lys Phe Asp 360 Phe Tyr Asp Pro Lys Thr Pro Phe Phe Thr Ala Pro Arg Cys Leu Pro 370 Pro Thr Gln Leu Asp Lys Cys Lys Met Lys Tyr Ala Phe Ile Ser Asp 385 Gly Cys Leu Leu Arg Glu Cys Asn Ile Glu His Ser Val Ile Gly Val

Cys Ser Arq Val Ser Ser Gly Cys Glu Leu Lys Asp Ser Val Met Met

425

420

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Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val Ile Thr
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Asn Ser Lys Gly Ile Gln Glu Ala Asp His Pro Glu Glu Gly Tyr Tyr
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agt att ggg ggc aga aag cag gag aaa gct ttg aga aat agg tgc ttt 14 Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe 35 40 45

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gct gat gca aac cgt gta tct gck atc att ttg ggc gga ggc act gga 291 Ala Asp Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly 80 85

tct cag ctc ttt cct ctg aca agc aca aga gct acg cct gct gta cct Ser Gln Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro 95 100 105 105

gtt gga gga tgt tac agg ctt att gat atc cct atg agt aac tgc ttc 387 Val Gly Gys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe 115 120 125

aac agt ggt ata aat aag ata ttt gtg atg agt cag ttc aat tct act 435 Asn Ser Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr 130 135 140

tog ott aac ogo cat att cat ogt aca tac ott gaa ggc ggg atc aac 483 Ser Leu Asn Arg His Ile His Arg Thr Tyr Leu Glu Gly Gly Ile Asn 155

ttt gct gat gga tct gta cag gta tta gcg gct aca caa atg cct gaa 531 Phe Ala Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu 160 165

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atc tgg gta ctc gag gat tat tac agt cac aaa tcc att gac aac att 62' Ile Trp Val Leu Glu Asp Tyr Tyr Ser His Lys Ser Ile Asp Asn Ile 195 205

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				act gag cag Thr Glu Gln		
				ttc act gca Phe Thr Ala		
			Cys Lys	atg aaa tat Met Lys Tyr 395	Ala Phe	
				atc gag cat Ile Glu His 410		
		l Ser Ser		gaa ctc aag Glu Leu Lys 425		
atg atg gga	gcg gac at	c tat gaa	act gaa	gaa gaa gct	tca aag	cta 1347

Met	Met	Gly	Ala	Asp 435	Ile	Tyr	Glu	Thr	Glu 440	Glu	Glu	Ala	Ser	Lys 445	Leu	
	tta Leu															1395
	aac Asn															1443
	aca Thr 480															1491
	tac Tyr															1539
	gat Asp					taga	atcg	get (gegtl	ctgc	1					1576
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Arg	Ser	Cys	Glu 20	Gly	Asp	Gly	Ile	Asp 25	Arg	Leu	Glu	Lys	Leu 30		Ile	
Gly	Gly	Arg 35	Lys	Gln	Glu	Lys	Ala 40	Leu	Arg	Asn	Arg	Cys 45	Phe	Gly	Gly	
Arg	Val 50	Ala	Ala	Thr	Thr	Gln 55	Cys	Ile	Leu	Thr	Ser 60	Asp	Ala	Cys	Pro	
Glu 65	Thr	Leu	His	Ser	Gln 70	Thr	Gln	Ser	Ser	Arg 75	Lys	Asn	Tyr	Ala	Asp 80	
Ala	Asn	Arg	Val	Ser 85	Ala	Ile	Ile	Leu	Gly 90	Gly	Gly	Thr	Gly	Ser 95		
Leu	Phe	Pro	Leu 100	Thr	Ser	Thr	Arg	Ala 105	Thr	Pro	Ala	Val	Pro		Gly	
		Tyr	_	_				_			_	_		_		

Gly	Ile 130	Asn	Lys	Ile	Phe	Val 135	Met	Ser	Gln	Phe	Asn 140	Ser	Thr	Ser	Leu
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Asp	Gly	Ser	Val	Gln 165	Val	Leu	Ala	Ala	Thr 170	Gln	Met	Pro	Glu	Glu 175	Pro
Ala	Gly	Trp	Phe 180	Gln	Gly	Thr	Ala	Asp 185	Ser	Ile	Arg	Lys	Phe 190	Ile	Trp
Val	Leu	Glu 195	Asp	Tyr	Tyr	Ser	His 200	Lys	Ser	Ile	Asp	Asn 205	Ile	Val	Ile
Leu	Ser 210	Gly	Asp	Gln	Leu	Tyr 215	Pro	Met	Asn	Tyr	Met 220	Glu	Leu	Val	Gln
Lys 225	His	Val	Glu	Asp	Asp 230	Ala	Asp	Ile	Thr	Ile 235	Ser	Cys	Ala	Pro	Val 240
Asp	Glu	Ser	Arg	Ala 245	Ser	Lys	Asn	Gly	Leu 250	Val	Lys	Ile	Asp	His 255	Thr
Gly	Arg	Val	Leu 260	Gln	Phe	Phe	Glu	Lys 265	Pro	Lys	Gly	Ala	Asp 270	Leu	Asn
Ser	Met	Arg 275	Val	Glu	Thr	Asn	Phe 280	Leu	Ser	Tyr	Ala	Ile 285	Asp	Asp	Ala
Gln	Lys 290	Tyr	Pro	Tyr	Leu	Ala 295	Ser	Met	Gly	Ile	Tyr 300	Val	Phe	Lys	Lys
Asp 305	Ala	Leu	Leu	Asp	Leu 310	Leu	Lys	Ser	Lys	Tyr 315	Thr	Gln	Leu	His	Asp 320
Phe	Gly	Ser	Glu	Ile 325	Leu	Pro	Arg	Ala	Val 330	Leu	Asp	Tyr	Ser	Val 335	Gln
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Phe	Tyr 370	Asp	Pro	Lys	Thr	Pro 375	Phe	Phe	Thr	Ala	Pro 380	Arg	Cys	Leu	Pro
Pro 385	Thr	Gln	Leu	Asp	Lys 390	Cys	Lys	Met	Lys	Tyr 395	Ala	Phe	Ile	Ser	Asp 400
Gly	Cys	Leu	Leu	Arg 405	Glu	Cys	Asn	Ile	Glu 410	His	Ser	Val	Ile	Gly 415	Val
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Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val Ile Thr
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Asn Ser Lys Gly Ile Gln Glu Ala Asp His Pro Glu Glu Gly Tyr Tyr
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Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
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agt att ggg ggc aga aag cag gag aaa gct ttg aga aat agg tgc ttt
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Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe
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                                                                   195
Gly Gly Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala
tgt cct gaa act ctt cat tct caa aca cag tcc tct agg aaa aat tat
                                                                   243
Cys Pro Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr
         65
get gat gea aac egt gta tet gek ate att ttg gge gga gge aet gga
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Ala Asp Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly
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tot cag oto tit cot otg aca ago aca aga got acg cot got gta cot
                                                                   339
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Val Gly Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe
                                     120
aac agt ggt ata aat aag ata ttt gtg atg agt cag ttc aat tct act
Asn Ser Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr
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tog ott aac ogc oat att oat ogt aca tac ott gaa ggo ggg atc aac
Ser Leu Asn Arg His Ile His Arg Thr Tyr Leu Glu Gly Gly Ile Asn
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Phe Ala Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu
    160
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Glu Pro Val Gly Trp Phe Gln Gly Thr Ala Asp Ser Ile Arg Lys Phe
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ttg aat tot atg Leu Asn Ser Met				
gat gca cag aaa Asp Ala Gln Lys 290				
aag aaa gat gca Lys Lys Asp Ala 305		u Leu Lys Ser		
cat gac ttt gga His Asp Phe Gly 320				
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aaa tca ttc ttt Lys Ser Phe Phe				
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Ser Asp Gly Cys Leu Leu Arg Glu Cys Asn Ile Glu His Ser Val Ile 400 405 410	
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agg aac tgt atc att gac atg aat gct agg att ggg aag aac gtg gtc Arg Asn Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val 465 470 475	
atc aca aac agt aag ggc atc caa gag gct gat cac ccg gaa gaa ggc Ile Thr Asn Ser Lys Gly Ile Gln Glu Ala Asp His Pro Glu Glu Gly 480 485	1491
tac tac ata agg tct gga atc gtg gtg atc ctg aag aat gca acc atc Tyr Tyr Ile Arg Ser Gly Ile Val Val Ile Leu Lys Asn Ala Thr Ile 495 500 505 510	
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Gly	Ile 130	Asn	Lys	Ile	Phe	Val 135	Met	Ser	Gln	Phe	Asn 140	Ser	Thr	Ser	Leu
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Asp	Gly	Ser	Val	Gln 165	Val	Leu	Ala	Ala	Thr 170	Gln	Met	Pro	Glu	Glu 175	Pro
Val	Gly	Trp	Phe 180	Gln	Gly	Thr	Ala	Asp 185	Ser	Ile	Arg	Lys	Phe 190	Ile	Trp
Val	Leu	Glu 195	Asp	Tyr	Tyr	Ser	His 200	Lys	Ser	Ile	Asp	Asn 205	Ile	Val	Ile
Leu	Ser 210	Gly	Asp	Gln	Leu	Tyr 215	Arg	Met	Asn	Tyr	Met 220	Glu	Leu	Val	Gln
Lys 225	His	Val	Glu	Asp	Asp 230	Ala	Asp	Ile	Thr	Ile 235	Ser	Cys	Ala	Pro	Val 240
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Ser	Met	Arg 275	Val	Glu	Thr	Asn	Phe 280	Leu	Ser	Tyr	Ala	Ile 285	Asp	Asp	Ala
Gln	Lys 290	Tyr	Pro	Tyr	Leu	Ala 295	Ser	Met	Gly	Ile	Tyr 300	Val	Phe	Lys	Lys
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Phe	Gly	Ser	Glu	Ile 325	Leu	Pro	Arg	Ala	Val 330	Leu	Asp	His	Ser	Val 335	Gln
Ala	Сув	Ile	Phe 340	Thr	Gly	Tyr	Trp	Glu 345	Asp	Val	Gly	Thr	Ile 350	Lys	Ser
Phe	Phe	Asp 355	Ala	Asn	Leu	Ala	Leu 360	Thr	Glu	Gln	Pro	Ser 365	Lys	Phe	Asp
Phe	Tyr 370	Asp	Pro	Lys	Thr	Pro 375	Phe	Phe	Thr	Ala	Pro 380	Arg	Cys	Leu	Pro

59

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Cys Ser Arg Val Ser Ser Gly Cys Glu Phe Lys Asp Ser Val Met Met
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Gly Ala Asp Ile Tyr Glu Thr Glu Glu Glu Ala Ser Lys Leu Leu Leu
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Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val Ile Thr
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Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
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agt att ggg ggc aga aag cag gag aaa gct ttg aga aat agg tgc ttt
                                                                   147
Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe
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ggt ggt aga gtt gct gca act aca caa tgt att ctt acc tca gat gct
                                                                   195
Gly Gly Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala
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tot cot caa act ctt cat tot caa aca caq too tot agg aaa aat tat
                                                                   243
Cys Pro Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr
get gat gea aac egt gta tet gek ate att ttg gge gga gge act gga
                                                                   291
Ala Asp Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly
tot cag etc ttt cet etg aca age aca aga get acg eet get gta eet
                                                                   339
Ser Gln Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro
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Val Gly Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe
                                     120
                115
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Asn Ser Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr
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			gag Glu						723
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			gtt Val						867
			cca Pro						915

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Lys Ser Phe Phe Asp Ala Asn Leu Val Leu Thr Glu Gln Pro Ser Lys $355 \hspace{1cm} 360 \hspace{1cm} 360$	
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gga gtc tgc tca cgt gtc agc tct gga tgt gaa ctc aag gac tcc gtg Gly Val Cys Ser Arg Val Ser Ser Gly Cys Glu Leu Lys Asp Ser Val 415 $420 \hspace{1cm} 425 \hspace{1cm} 430$	1299
atg atg gga gcg gac atc tat gaa act gaa gaa gaa gct tca aag cta Met Met Gly Ala Asp Ile Tyr Glu Thr Glu Glu Glu Ala Ser Lys Leu 435 $440 \qquad \qquad 445$	1347
ctg tta gct ggg aag gtc ccr gtt gga ata gga aag aac aca aag ata Leu Leu Ala Gly Lys Val Pro Val Gly Ile Gly Arg Asn Thr Lys Ile 450 450 460	1395
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Arg	Val 50	Ala	Ala	Thr	Thr	Gln 55	Cys	Ile	Leu	Thr	Ser 60	Asp	Ala	Cys	Pro
Glu 65	Thr	Leu	His	Ser	Gln 70	Thr	Gln	Ser	Ser	Arg 75	Lys	Asn	Tyr	Ala	Asp 80
Ala	Asn	Arg	Val	Ser 85	Ala	Ile	Ile	Leu	Gly 90	Gly	Gly	Thr	Gly	Ser 95	Gln
Leu	Phe	Pro	Leu 100	Thr	Ser	Thr	Arg	Ala 105	Thr	Pro	Ala	Val	Pro 110	Val	Gly
Gly	Cys	Tyr 115	Arg	Leu	Ile	Asp	Ile 120	Pro	Met	Ser	Asn	Cys 125	Phe	Asn	Ser
Gly	Ile 130	Asn	Lys	Ile	Phe	Val 135	Met	Ser	Gln	Phe	Asn 140	Ser	Thr	Ser	Leu
Asn 145	Arg	His	Ile	His	Arg 150	Thr	Tyr	Leu	Glu	Gly 155	Gly	Ile	Asn	Phe	Ala 160
Asp	Gly	Ser	Val	Gln 165	Val	Leu	Ala	Ala	Thr 170	Gln	Met	Pro	Glu	Glu 175	Pro
Ala	Gly	Trp	Phe 180	Gln	Gly	Thr	Ala	Asp 185	Ser	Ile	Arg	Lys	Phe 190	Ile	Trp
Val	Leu	Glu 195	Asp	Tyr	Tyr	Ser	His 200	Lys	Ser	Ile	Asp	Asn 205	Ile	Val	Ile
Leu	Ser 210	Gly	Asp	Gln	Leu	Tyr 215	Arg	Met	Asn	Tyr	Met 220	Glu	Leu	Val	Gln
Lys 225	His	Val	Glu	Asp	Asp 230	Ala	Asp	Ile	Thr	Ile 235	Ser	Cys	Ala	Pro	Val 240
Asp	Glu	Ser	Arg	Ala 245	Ser	Lys	Asn	Gly	Leu 250	Val	Lys	Ile	Asp	His 255	Thr
Gly	Arg	Val	Leu 260	Gln	Phe	Phe	Glu	Lys 265	Pro	Lys	Gly	Ala	Asp 270	Leu	Asn
Ser	Met	Arg 275	Va1	Glu	Thr	Asn	Phe 280	Leu	Ser	Tyr	Ala	Ile 285	Asp	Asp	Ala
Gln	Lys 290	Tyr	Pro	Tyr	Leu	Ala 295	Ser	Met	Gly	Ile	Tyr 300		Phe	Lys	Lys
Asp 305		Leu	Leu	Asp	Leu 310	Leu	Lys	Ser	Lys	Tyr 315		Gln	Leu	His	Asp 320

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Gly Cys Leu Leu Arg Glu Cys Asn Ile Glu His Ser Val Ile Gly Val
Cys Ser Arq Val Ser Ser Gly Cys Glu Leu Lys Asp Ser Val Met Met
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Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val Ile Thr
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Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
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agt att ggg ggc aga aag cag gag aaa gct ttg aga aat agg tgc ttt
                                                                    147
Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe
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Gly Gly Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala
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tgt cct qaa act ctt cat tct caa aca cag tcc tct agg aaa aat tat
                                                                    243
Cvs Pro Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr
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Ala Asp Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly
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                         85
tot cag ctc ttt cct ctg aca agc aca aga gct acg cct gct gta cct
Ser Gln Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro
                     100
                                                             110
95
gtt gga gga tgt tac agg ctt att gat atc cct atg agt aac tgc ttc
Val Gly Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe
                                                         125
                115
                                     120
age agt ggt ata agt agg ata ttt gtg atg agt cag ttc agt tct act
                                                                    435
Asn Ser Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr
                                 135
tog ott aac oge cat att cat ogt aca tac ott gaa ggc ggg atc aac
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						atc Ile 325										1011
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						aac Asn										1107

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		ccg Pro 385														1203
		ggt Gly														1251
		tgc Cys														1299
		gga Gly														1347
		gct Ala														1395
		tgt Cys 465														1443
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Gly Cys Tyr Arg	Leu Ile	Asp Ile 120	Pro Met	Ser Asn	Cys Phe 125	Asn Sei	£
Gly Ile Asn Lys 130		Val Met 135	Ser Gln	Phe Asn 140	Ser Thr	Ser Let	1
Asn Arg His Ile 145	His Arg '	Thr Tyr	Leu Glu	Gly Gly 155	Ile Asn	Phe Ala	
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Lys His Val Gl 225	Asp Asp . 230	Ala Asp	Ile Thr	Ile Ser 235	Cys Ala	Pro Val	
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Gln Lys Tyr Pr 290		Ala Ser 295	Met Gly	Ile Tyr 300	Val Phe	Lys Ly	s
Asp Ala Leu Le 305	u Asp Leu 310	Leu Lys	Ser Lys	Tyr Thr 315	Gln Leu	His Asp	
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Pro Thr Gln Leu Asp Lys Cys Lys Met Lys Tyr Ala Phe Ile Ser Asp
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Cys Ser Arg Val Ser Ser Gly Cys Glu Leu Lys Asp Ser Val Met Met
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Ala Gly Lys Val Pro Val Gly Ile Gly Arg Asn Thr Lys Ile Arg Asn
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Cys Ile Ile Asp Met Asn Ala Arg Ile Gly Lys Asn Val Val Ile Thr
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Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
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agt att ggg ggc aga aag cag gag aaa gct ttg aga aat agg tgc ttt
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Ser Ile Gly Gly Arq Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe
ggt ggt aga gtt gct gca act aca caa tgt att ctt acc tca gat gct
                                                                   195
Gly Gly Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala
tgt cct gaa act ctt cat tct caa aca cag tcc tct agg aaa aat tat
                                                                   243
Cys Pro Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr
get gat gea aac egt gta tet gek ate att ttg gge gga gge aet gga
                                                                   291
Ala Asp Ala Asn Arg Val Ser Ala Ile Ile Leu Gly Gly Gly Thr Gly
tet cag etc ttt eet etg aca age aca aga get aeg eet get gta eet
                                                                   339
Ser Gln Leu Phe Pro Leu Thr Ser Thr Arg Ala Thr Pro Ala Val Pro
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Val Gly Gly Cys Tyr Arg Leu Ile Asp Ile Pro Met Ser Asn Cys Phe
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Asn Ser Gly Ile Asn Lys Ile Phe Val Met Ser Gln Phe Asn Ser Thr
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ttt get gat gga tet gta cag gta tta geg get aca caa atg eet gaa
                                                                   531
Phe Ala Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu
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gag cca gct gga tgg ttc cag ggt aca gca gac tct atc aga aaa ttt
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						gag Glu										867
						tac Tyr										915
						gac Asp										963
						atc Ile 325										1011
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Ser As	at ggt sp Gly 00														1251
	tc tgc al Cys														1299
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	ac tgt sn Cys 465														1443
Ile Th	ca aac hr Asn 80														1491
	ac ata yr Ile														1539
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Phe Tyr Asp Pro Lys Thr Pro Phe Phe Thr Ala Pro Arg Cys Leu Pro

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Gln Ile Arg Ser Cys Glu Gly Asp Gly Ile Asp Arg Leu Glu Lys Leu
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agt att ggg ggc aga aag cag gag aaa gct ttg aga aat agg tgc ttt
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Ser Ile Gly Gly Arg Lys Gln Glu Lys Ala Leu Arg Asn Arg Cys Phe
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                                                                   195
Gly Gly Arg Val Ala Ala Thr Thr Gln Cys Ile Leu Thr Ser Asp Ala
tgt cct gaa act ctt cat tct caa aca cag tcc tct agg aaa aat tat
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Cys Pro Glu Thr Leu His Ser Gln Thr Gln Ser Ser Arg Lys Asn Tyr
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                                                                    435
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Phe Ala Asp Gly Ser Val Gln Val Leu Ala Ala Thr Gln Met Pro Glu
                                             170
    160
                         165
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					cga Arg											771
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					gaa Glu											1011
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Val Pro Asp Phe Ser Phe Tyr Asp Arg Ser Ala Pro Ile Tyr Thr Gln
Pro Arg Tyr Leu Pro Pro Ser Lys Met Leu Asp Ala Asp Val Thr Asp
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Ser Val Val Gly Leu Arg Ser Cys Ile Ser Glu Gly Ala Ile Ile Glu
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Cys His Ile Lys Arg Ala Ile Ile Asp Lys Asn Ala Arg Ile Gly Asp
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